SUPPORT FOR THE AMENDMENT

Support for claim 26 is found in paragraph [0033] of the specification. Support for claim 27 is found in paragraph [0034] of the specification. Support for claim 28 is found in paragraph [0036] of the specification. Support for claim 29 is found in paragraph [0037] of the specification. No new matter would be added to this application by entry of this amendment.

Upon entry of applicants' amendment, claims 1-12, 14, 16-23 and 26-29 will now be active in this application with claims 12, 14, 16-19, 22-23 and 26-29 being under active consideration.

REQUEST FOR RECONSIDERATION

The claimed invention is directed to a process for producing a low-caffeine green tea extract.

Green tea has received considerable interest as a source of catechins and the recognized physiological effects of catechins. Due to otherwise low catechin concentrations in green tea, concentrated extracts have been prepared which can increase the availability of catechins. However, tea leaves also contain caffeine, a compound which can have adverse effects, especially when consumed in large quantities. While decaffeinating procedures have been developed, issues as to color deterioration can be observed. Accordingly, methods for preparing low-caffeine green tea extracts are sought.

The claimed invention addresses this problem by providing a low-caffeine green tea producing process which comprises contacting a green tea extract with a combination of organic solvent and water, activated carbon and acid clay or activated clay. Applicants have discovered the combination of activated carbon with acid clay and/or activated clay and combination of organic solvent and water to provide for effective caffeine reduction without significantly deteriorating the color. Such a process is nowhere disclosed or suggested in the cited art of record.

The rejections of claims 12, 14 and 22 under 35 U.S.C. §102(a) and of claims 15-16, 23 and 25 under 35 U.S.C. §103(a) each over Takahashi et al JP 2004-222719, of claims 13 and 24 under 35 U.S.C. §103(a) in view of Funahashi et al. JP 2000-166466 and of claim 25 under 35 U.S.C. §103(a) in view of Funahashi et al. JP 2000-166466, Katz U.S. 4,324,840 and Bailey et al. U.S. 6,210,679 are respectfully traversed.

Applicants note that Takahashi et al JP 2004-222719 was published on August 12, 2004. Applicants claim the benefit of priority to JP 2003-402533 filed on December 2, 2003, JP 2003-524557 filed on December 22, 2003 and JP 2004-050719 filed on February 26,

2004. Each of these JP filing dates are earlier than the August 12, 2004 publication date of Takahashi et al. In order to perfect applicants' claim to priority, applicants submit herewith certified English language translations of JP 2003-402533, JP 2003-524557 and JP 2004-050719. Certified copies of these priority documents were filed under the provisions of 35 U.S.C. §371 on June 1, 2006, the filing of which being recognized by the USPTO in a "Notice of Acceptance of Application Under 35 U.S.C. §371 and 37 CFR 1.495" dated March 2, 2007. Applicants respectfully request the full benefit of priority to JP 2003-402533, JP 2003-524557 and JP 2004-050719. Since applicants' priority date is earlier than the publication date of Takahashi et al. the reference is not available as prior art against the claimed invention and accordingly all of the rejections based on this reference must be withdrawn. Withdrawal of the rejections under 35 U.S.C. 102(a) and 35 U.S.C. 103(a) is respectively requested.

The rejections of claims 12-13, 15-16, 22 and 24-25 under 35 U.S.C. §103(a) over Funahashi et al. JP 2000-166466 in view of Hall, Jr. et al. U.S. 4,229,612, Katz U.S. 4,324,840 Klima et al. U.S. 4976979 and in further view of Bailey et al. U.S. 6,210,679, of claims 14 and 25 under 35 U.S.C. §103(a) in further view of Tsai et al. U.S. 4,935,256 and of claim 23 under 35 U.S.C. §103(a) in further view of Nakamura et al. JP 06-142405 are respectfully traversed.

None of the cited art of record disclose or suggests an enhancement in caffeine removal using a combination of activated carbon and acid clay or activated clay and a solvent comprising 91-97 wt. % organic solvent in water.

Funahashi et al. describes preparation of an antimicrobial agent for pickled food in which tea leaves are primarily extracted with water or acidic water and then the tea leaves are further extracted with at least one of water, ethanol, acetone, aqueous ethanol and aqueous acetone (abstract). Paragraph [0033] has been cited for disclosing treatment of the tea extract

with a known clay adsorbent for the removal of caffeine, there is no disclosure of using the combination of activated carbon and acid clay or activated clay (page 5 of official action).

Not withstanding the deficiency of the reference to disclose the use of activated carbon, the machine language translation does not make clear whether the contacting of the extract with magnesium silicate is conducted in the presence of a combination of organic solvent and water. Moreover, there certainly is no disclosure of the use of a 91-97 wt. % mixture of organic solvent in water. Thus, the primary reference is deficient in 1) disclosing the combination of activated carbon and acid clay or activated clay, and 2) the use of a mixture of 91-97 wt. % organic solvent and water.

Applicants observe an enhancement in caffeine extraction without observing a deterioration in color by using the combination of activated carbon and acid clay or activated clay, and the use of a mixture of 91-97 wt. % organic solvent and water.

As evidence of an enhancement in caffeine removal by using the combination of activated carbon and acid clay or activated clay, and the use of a mixture of 91-97 wt. % organic solvent and water, applicants have conducted additional experiments, as follows:

Caffeine removal and coloration of a green tea extract was measured comparing the combination of adsorbents of activated carbon and acid clay with activated carbon alone, acid clay alone, and a mixture of less than 91% of organic solvent in water. For the examiner's convenience a portion of the data is reproduced below:

	Example 1 in the present application	Additional comparative Example 1	Additional comparative Example 2	Additional comparative Example 3	Additional comparative Example 4
Solid green tea extract(g) (POLYPHENON HG product of Tokyo Food Techno CO., Ltd)	200	200	200	200	200
Ethanol (g)	760	560	760	760	760
Water(g)	40	240	40	40	40
Activated Carbon (g) (KURARAYCOAL GLC product of Kuraray Chemical K.K.)	20	20	0	0	20
Acid Clay (g) (MIZUKA ACE#600, product of Mizusawa Chemical Industries, Ltd.	100	100	100	120	0
Organic solvent / Water (weight ratio)	95/5	70/30	95/5	95/5	95/5
Non-polymer catechins / caffeine after treatment (weight ratio)	33.0	35.9	16.4	20.4	18.5
Gallates percentage of non-polymer catechins after treatment (wt %)	51.0	52.4	52.4	52.7	49.6
Gallocatechins percentage of non-polymer catechins after treatment (wt %)	74.9	78.8	77.2	77.2	77.1
Concentration of non-polymer catechins in solid after treatment (wt %)	66	49	61	63	64
Absorbance (-)	0.038	0.058	0.098	0.099	0.018

Assessment of purified products	Caffeine content was lowered, color was good, and stability was visually good.	Color deteriorated and concentration of non-polymer catechins in solid after treatment was lowered.	Caffeine content was not lowered and color deteriorated.	Caffeine content was not lowered and color deteriorated.	Caffeine content was not lowered.

Comparative examples 2, 3 and 4 demonstrate the degree of caffeine removal when using only one of activated carbon or acid clay. In each case, **a reduction in the caffeine content was not detected** using either adsorbent alone. Further, using a mixture of only 70 wt. % ethanol in water and a combination of activated carbon and acid clay, even though the caffeine content was lowered, a substantial reduction in the non-polymer catechins in the solids after treatment was also observed.

In contrast, using a combination of activated carbon and acid clay and mixture of 95 wt. % ethanol in water, the caffeine content was reduced, the concentration of non-polymer catechins in solid after treatment remained high, and the color was good and stability was visually good. Thus, by using the combination of activated carbon and acid clay or activated clay, with a mixture of 91-97 wt. % of organic solvent in water, applicants are able to reduce the caffeine content, keep the catechin content high and maintain a good color.

Such results are not suggested by Funahashi et al. alone, as neither the use of activate carbon nor the use of 91-97 wt. % organic solvent in water are disclosed. Such enhancements to a caffeine removal process could therefore not have been suggested.

The basic deficiencies of the primary reference are not cured by any of the secondary references.

Hall, Jr. et al. has been cited for evidence that magnesium silicate is a clay adsorbent. Applicants note that applicants' specification identifies on page 16 acid clay and activated clay as containing, as general chemical components SiO_2, Al_2O_3, Fe_2O_3, CaO, MgO, etc. but does not identify all clays which contain MgO and SiO_2 as acid clays or activated clays. Thus, Hall, Jr. et al., fails to provide evidence that Funahashi et al. disclose use of an acid clay. None the less, Hall, Jr. et al. fails to suggest any enhancement in caffeine removal by using a combination of activated carbon with acid clay or activated clay and the claimed combination of organic solvent and water.

Katz has been cited for disclosing the use of a combination of activated carbon and clay for removing caffeine, citing to claim 8. Applicants note that claim 8 only identifies activated carbon and clay as equivalent solid caffeine adsorbents but fails to identify either of acid clay or activated clay, nor an enhancement in caffeine removal by using both activated carbon and acid clay or activated clay with the combination of organic solvent and water, as claimed.

Klima et al. has been cited for the use of multiple extractions components in rejecting claim 15. Applicants note that claim 15 has been canceled and Klima et al. fail to suggest an enhancement in caffeine removal by using both activated carbon and acid clay or activated clay with the combination of organic solvent and water, as claimed.

Bailey et al. has been cited for a disclosure of extraction techniques to obtain green tea extract using 95% ethanol. Applicants note that the cited disclosure describes the **desorption of catechins** from an adsorbent to which catechins have been specifically adsorbed. Using 95% ethanol **to desorb catechins** from an adsorbent fails to suggest such using 95% aqueous ethanol in the **adsorption of caffeine** on to an adsorbent. Moreover, the reference fails to suggest an enhancement in caffeine removal by using both activated carbon and acid clay or activated clay with the combination of organic solvent and water, as claimed.

Tsai et al. has been asserted as disclosing the convention concept of dissolving dry green tea extract in an organic solvent prior to further extraction. Applicants note that Tsai et al. describe **the extraction of flavanol compounds** from natural sources in which flavanols are extracted into hot water, green and grassy flavors are removed by extraction with hexane and alcohol followed by isolation of flavanols by extraction of the aqueous phase into ethyl acetate (column 2, lines 6-17). Thus, while dissolution of dry green tea extract may be conventional in the isolation of flavanols **by liquid extraction**, such does not suggest

dissolving green tea extract in an organic solvent and water for treatment with a solid adsorbent.

Nakamura et al. has been cited as disclosing the use of an acid clay for removing caffeine from an aqueous solution but fails to disclose the combination of acid clay with activated carbon and therefore can not suggest an enhancement in caffeine removal from the combination using the combination of organic solvent and water, as claimed.

In view of the deficiencies of the cited art to disclose or suggest an enhancement in caffeine removal from the combination of activated carbon and acid clay or activated clay, using the combination of organic solvent and water, as claimed, the claimed invention would not have been obvious over the cited combination of references and accordingly, withdrawal of the rejections under 35 U.S.C. §103(a) is respectively requested.

The provisional rejections based on obviousness-type double patenting over co-pending applications 11/511,321, 10/532, 727, 11/434,069, 12/297,452 are noted and overcome by the attached terminal disclaimer disclaiming the terminal portion of any patent issuing from the above-identified application which would extend beyond the full statutory term of any patent issuing from any of the cited patent applications. Withdrawal of the provisional rejections is respectfully requested.

Applicants submit that this application is now in condition for allowance and early notification of such action is earnestly solicited.

Respectfully submitted,

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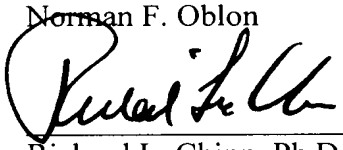

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